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ABSTRACT

The Open University of Israel (OUI) is a distance learning university. Learning is based mainly on textbooks and meetings with tutors in learning centers throughout the country. However, these meetings sometimes do not materialize. Synchronous virtual tutorials, via satellite communication from a studio at the university to classrooms throughout the country have been conducted during the last five years as a solution to this problem. Seven two-hour satellite tutorials were conducted in a course for social science students during five semesters. Each satellite-based synchronous tutorial was saved on a videocassette that could be sent to students as an asynchronous tutorial. Satellite-based synchronous tutorials were compared with satellite-based asynchronous tutorials delivered on videocassettes. All students answered a questionnaire about their learning-habit preferences. Students who preferred the satellite-based synchronous tutorials were compared to those who preferred the satellite-based asynchronous videocassettes on four scales of the learning-habit preferences questionnaire. Those who preferred the synchronous tutorial were significantly higher in their belief in the positive aspects of interactions and significantly lower on learning autonomy and the need to "have" all material than those who preferred the asynchronous mode. In general, students' tutorial-mode preferences depend on their learning-habits preferences as measured on a Likert type questionnaire: their attitudes toward the control of learning and the possible contribution of interactions. (AEF)

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Satellite Based Synchronous Tutorials vs. Satellite Based Asynchronous Videocassettes: Factors Affecting Students' Attitudes and Choices

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Background

The Open University of Israel (OUI) is a distance learning university. Learning is based mainly on specially written textbooks and tutorial meetings (once a week or once in three weeks) in learning centers throughout the country. Indeed, meetings with tutors at learning centers bring the university closer to the students and allow for face to face interaction between tutors and learners and among the learners themselves. However, these meetings sometimes do not materialize, as it is difficult to find enough expert tutors for all groups of students, or students are so dispersed that though many are registered for a course, there are not enough students in each region to justify hiring a tutor.

Synchronous virtual tutorials, via satellite communication, from a studio at the university to classrooms throughout the country (by the best tutor) - have been conducted during the last five years as a solution to these problems. The communication between the tutor and the students is visual, audio and data-based. The visual communication is uni-directional from the studio to the classrooms (where the tutor is seen on a big TV screen). Audio information is bi-directional (from the studio to the classrooms and from the classrooms to other classrooms and to the studio). The lecturer and the other students can hear the student who has been given the floor by the tutor. With respect to data communication, the lecturer can present multiple choice questions to the students, ask them to answer the questions by pressing an appropriate button on the satellite phone, and immediately present the distribution of answers to the students.

Seven such two-hour satellite tutorials were conducted in a "Basic Research Methods" course (for social science students) during 5 semesters. A number of factors gave rise to second thoughts about the choice of synchronous satellite tutorials as an ultimate solution: (a) only 25% of the registered students joined the tutorial sessions; (b) most students who joined the tutorials did not participate actively in the interactions initiated by the tutor or did not initiate any interaction themselves; and (c) the satellite technology has proved to be very costly.

Each satellite-based synchronous tutorial is saved on a videocassette. These cassettes can be sent to students as asynchronous tutorials. **Table 1** compares satellite-based synchronous tutorials to satellite-based asynchronous tutorials delivered on videocassettes.

Table 1: Factors differentiating between satellite-based synchronous tutorials and satellite-based asynchronous videocassettes

Dimension	**Satellite-based synchronous tutorials**	**Satellite-based asynchronous videocassettes**
The location of the tutorial	In classroom	At home
Time of tutorial	Specific – tutor and students at the same time	Flexible at students' convenience
Accessibility of materials	Not accessible after the end of the lesson	Accessible at any time
Interaction with the tutor during the tutorial	Possible	Impossible
Interaction with other students during the tutorial	Possible	Impossible
Cost of technology	High	Low

In light of the above comparison and students' behavior (absences and lack of participation), we decided to study students' preferences regarding the mode of tutorials. In particular:

1. What are students' attitudes towards the tutorial modes and their dimensions (i.e., flexibility, interaction and accessibility). As can be seen from Table 1, the two types of tutorials differ in the amount of control the student has over the learning process (the first three dimensions) and in the amount of interaction between tutor and students (in the last two dimensions). Learner control is known to be associated with active learning and student-centered learning (Doherty, 1998). Interactions between students and tutor and among the students themselves is one way to increase instructional immediacy and social presence which are positively related to students' satisfaction and motivation in learning (e.g., Christophel, 1990; Swan, 2001). Will students prefer control over their learning process at the expense of losing social immediacy, or vice versa?
2. Are students' attitudes and preferences related to their learning-habits preferences? Some research has been done on the relation between cognitive styles and instructional preferences (e.g., Sadler-Smith & Riding, 1999). The present study aims to examine the relation between learning-habits preferences and instructional preferences.
3. Are students' attitudes and preferences related to demographic and academic variables?

Some of our findings concerning these questions will be discussed in the next sections.

Method

Participants: Two groups of students (in the Research Methods Course) and one tutor took part in the research.
Group 1: 92 students who studied during the fall semester of 2001. They had seven satellite-based synchronous tutorials (two hours each) with their tutor.
Group 2: 73 students who studied during the spring semester of 2001. They had 4 satellite-based asynchronous videocassettes (based on those recorded during the previous semester) and 3 satellite-based synchronous tutorials with the same tutor.

Questionnaires: Three questionnaires were constructed-
1. Questionnaire 1: A feedback questionnaire on the satellite-based synchronous tutorials. The questionnaire included items relating to (a) attendance rate; (b) attitudes towards the tutor and the tutorials; (c) attitudes regarding the advantages and disadvantages of meeting and interacting with peers; (d) comparisons between face to face tutorials and satellite-based synchronous tutorials and (e) attitudes toward a **potential** asynchronous mode of tutorial via satellite-based videocassettes.
2. Questionnaire 2: A feedback questionnaire on asynchronous tutorials delivered via videocassettes. It contained items similar to those in the first questionnaire but relating to videocassettes and a comparison between three modes of tutorials: satellite-based synchronous and asynchronous, and face to face tutorials.
3. Questionnaire 3 - "How do I prefer to study?": This questionnaire contained items on four dimensions: (a) the importance of autonomy in management of learning time; (b) the importance of ease of accessibility to all learning materials; (c) the importance of synchronous interactions with the tutor (d) the importance of synchronous interactions with other student s. For each of the four dimensions, a number of statements were formulated differing in the affective influence and in the cognitive influence of the dimension and the direction of that influence (positive or negative). For example, with regard to time management:
1. When I am responsible for my pace of learning I feel I have control (positive, affective)
2. When I am responsible for my pace of learning I feel helpless (negative, affective)
3. My learning is more efficient when I am responsible for my pace of learning (positive, cognitive)
4. My learning is more efficient when the timetable of the course is determined by the teaching team (negative, cognitive).
The questionnaire included 56 statements (in random order) on a Likert scale from 1- "doesn't describe me at all" to 5 - "describes me very well".

The "How do I prefer to study?" questionnaire was administered to 288 "Research Methods" students who were not part of the experiment. Factor analysis revealed four independent factors (scales): time management (high score indicates learning autonomy), ease of accessibility to learning material (high score indicates the subject's need to "have" all material), positive aspects of interaction (high score indicates that the subject has more positive views regarding interactions - with tutor and other students) and negative aspects of interaction (high score indicates that the subject has few views regarding the negative aspects of interaction)[1]. Thus, four scores were constructed for each subject, one for each factor. There was no correlation between the scores and the following variables: gender, age and number of credits accumulated at the OUI.

Procedure: At the end of the fall semester, Questionnaire 1 (experience with seven satellite-based synchronous tut orials), and Questionnaire 3 ("How do I prefer to study?") were mailed to students in Group 1, who were asked to fill them out in that order. At the end of the spring semester, Questionnaire 1, Questionnaire 2 (experience with the four satellite-based asynchronous tutorials on videocassette) and Questionnaire 3 (in that order) were sent to students in Group 2. Forty-three (46.7%) students in Group 1and 31 (42.7%) students in Group 2 returned the questionnaires.

Results

Group participation in learning activities: On average, Group 1 students participated in 2.9 of the seven satellite-based synchronous meetings (41.4%). Group 2 students participated on average only in 1.1 of 3 (36.7%). This difference is not significant. All students rated as high all audio and visual characteristics of the two technologies used. From reports of Group 2 students, it seems they created a learning environment at home in which others did not disturb them while they were watching the tutorial.

With regard to the activities associated with the satellite-based asynchronous videocassettes, 41.9% students reported they watched all 4 lessons, 91.7% stated they watched them only once, 56% used the back and forward option, 66.7% summarized while watching (most by stopping the video) and most of those who summarized (81.2%) indicated that they would read the summary before the final examination.

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[1]Contrary to intuitve perception which sees the two extreme sides of a dimension (e.g., high and low) as negatively correlated, the Psychology literature on attitudes demonstrates that often the two end points of a dimension are two independent factors (Eagly and Chaiken, 1998).

Group comparisons: Groups 1 and 2 did not differ significantly in gender (males: 58.5% and 57.6% in the two groups, respectively). **Table 2** presents data comparing Groups 1 and 2 on background, academic and learning-habit preferences variables.

Table 2: Background, academic and learning-habit preferences in Groups 1 and 2

Variable	Group 1		Group 2	
	M	SD	M	SD
Age	29.6	5.7	30.0	5.8
Final grade in course	71.2	8.9	72.8	8.3
GPA*	78.8	6.5	79.8	6.0
Scale 1 – Time management	3.5	0.8	3.4	0.6
Scale 2 – Ease of accessibility to learning material	4.0	0.6	3.9	0.5
Scale 3 – Positive aspects of interactions	3.1	0.7	3.2	0.5
Scale 4 – Negative aspects of interactions	3.8	0.6	3.9	0.5

*Grade point average at the stage the student registered for the Research Method course

There were no significant differences between the two groups in none of the background, academic and learning-habits preferences variables presented in Table 2. Both groups were also similar in the learning materials they received (the same books and tutorials) and the tutor teaching them. As all these variables were controlled they cannot be considered an alternative explanation for any reported results (in the next sections) concerning the differences in the students' attitudes towards the different learning technologies used and their preferences (The Institute for Higher Education Policy, 1999).

Groups 1 and 2 evaluated the tutor and the satellite-based synchronous tutorials. Students were asked about the tutor's expertise, teaching pace, attentiveness to students, ability to excite interest and to clarify the material as well as command of the technology. They were also asked to rate the synchronous tutorials on a number of dimensions (how significant, interesting and organized they were, as well as the extent to which they contributed). On average, the tutor and the satellite-based synchronous tutorials were rated high (3-5 on a 1-5 scale) with no significant differences between Group 1 and Group 2. Group 2 students were asked to evaluate in a similar manner the tutor and the satellite-based asynchronous videocassettes (not including questions regarding the tutor's attentiveness to students and command of technology which were not relevant in the asynchronous mode of tutorials). Students' ratings of the tutor and the tutorials of the synchronous tutorials were compared to their ratings of asynchronous videocassettes (t test for dependent variables). No significant differences were detected. **Thus, when the same tutor gives the same tutorials to similar students, the evaluations of the tutor and the lessons are independent of the technology used.**

Attitudes toward interaction components: In both groups, subjects were asked whether the tutor devoted enough time to interaction with students. With regard to the synchronous tutorials, 73% of students were satisfied with the amount of interaction (no significant difference between the groups). Students in group 2 were asked the same question twice - once for the synchronous lessons and once for the asynchronous lessons. Most students indicated there was enough time allocated to interactions in both types of tutorials and the difference in response to the two questions was not significant. Most students in both groups (82.7%) indicated they participate less in synchronous satellite tutorials than in face-to-face tutorials. **Table 3** describes the results concerning interaction components in the satellite-based synchronous tutorials in Groups 1 and 2.

Table 3: Group 1 and 2 mean ratings for interaction components in the satellite-based synchronous tutorials.

	Group 1- synchronous		Group 2 – synchronous	
	M	SD	M	SD
During the satellite lesson, to what extent:				
. when you wanted to ask or respond, were you given the floor?	4.32	0.86	4.14	0.57
. are you disturbed by the fact that the tutor can't see you?	2.53	1.34	2.38	1.36
Other students in my class:				
. are important to me from a social perspective	2.66	1.10	2.24	1.09
. are important to me from a learning perspective	2.72	1.20	2.76	1.09
. disturb me during the lesson	1.69	0.97	1.57	0.87
ents in other classrooms:				
. are important to me from a social perspective	1.38	0.75	1.38	0.87
. are important to me from a learning perspective	1.69	0.97	1.86	1.01
. disturb me during the lesson	1.31	0.59	1.33	0.48
Questions by other students and the tutor's answers:				

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9. contribute to my learning	3.34	0.86	3.35	0.93
10. disturb my learning	2.28	0.99	2.19	1.08

None of the differences is significant, indicating that the **having less satellite-based synchronous tutorials** (3 instead of 7) **doesn't affect students' attitudes regarding the interaction components of those tutorials.**

Table 4 compares students' attitudes towards the interaction components of satellite-based synchronous tutorials to those components in the satellite-based asynchronous videocassettes. The numbers given to questions in Table 4 are similar to those in Table 3. None of the differences (for identical or for similar questions) were significant (t tests for two dependent variables).

Table 4: Group 2 students' attitudes towards the interaction components in satellite-based synchronous tutorials and asynchronous videocassettes.

	Group 2- synchronous*		Group 2 – asynchronous	
To what extent:	M	SD	M	SD
1a. are other students in my classroom important for me from a social perspective?	2.06	0.83		
1b. do I miss the presence of other students from a social perspective?			1.94	1.08
2a. are other students in my classroom important to me from a learning perspective?	2.53	1.01		
2b. do I miss the presence of other students from a learning perspective?			2.00	1.12
3a. are other students in my classroom important to me from a learning perspective?	2.53	1.01		
3c. are other students in the recorded lesson important to me from a learning perspective?			2.35	1.06
4a. do other students in the classroom disturb me during the lesson?	1.59	0.94		
4b. do other students in the recorded lesson disturb me during the lesson?			2.06	1.00
9. do questions by other students and the tutor's answers contribute to my learning?	3.13	0.81	2.81	0.75
10. do questions by other students and the tutor's answers disturb my learning?	2.35	1.11	2.41	1.18

* The results in the first two columns are not similar to those in the last two columns of Table 3 as not all subjects in Group 2 answered both kinds of questions, as necessary for a within subjects comparison.

Individual differences in the attitudes towards interaction components: Do learning-habits preferences, as measured in questionnaire 3 correlate with students' answers to the interaction questions concerning the different technologies? **Table 5** presents correlation coefficients which were computed for each one of the questions presented in Tables 3 and 4 with two of the interaction scores (positive and negative) derived from the learning habit preferences questionnaire. The bold correlations with the Positive Interaction factor are expected to be positive. The bold correlations with the Negative Interaction factor are expected to be negative.

Table 5: Correlation between answers to interaction questions (in Questionnaires 1 and 2) and interaction factors (derived from Questionnaire 3)

Question	Positive interaction	Negative interaction
3a	**0.43****	0.02
3b	**0.41***	0.03
4a	**0.27**	-0.12
4b	**0.31**	-0.02
4c	**0.51***	-0.11
5a	-0.14	**-0.08**
5b	-0.07	**-0.54****

9a	**0.52*** **	0.12
9b	**0.48***	0.03
10a	-0.38**	**-0.51*** **
10b	-0.26	**-0.45***

* 0.05 ** 0.01 ***0.001

The results in Table 5 strengthen the validity of the learning-habit preferences questionnaire. Students with a high score on the positive interaction factor (the subject holds more positive views regarding interactions - with tutor and students) believe more than others in the social contribution of other students and in their learning contribution. Students with a high score on the negative interaction factor (the subject holds **few** views regarding the negative aspects of interaction) perceive students' interactions in class as less disturbing.

Preferences of different learning technologies: Subjects in both groups were asked the following question: "Below are two types of tutorials with which you are acquainted: face-to-face tutorials and satellite-based classroom tutorials. On the assumption that the same tutor teaches the tutorials, mark with an X the method that you believe is the best way of learning with respect to the dimensions below". The 11 dimensions listed were: I understand the tutor better; I concentrate better; It is easier for me to summarize the tutorial; I ask more questions; I answer more questions; I enjoy the lesson more; I understand the material better; The questions I ask get more responses; I feel that I have better control of the situation; I feel more obligated to attend the tutorial; I prepare myself better for the tutorial. For each dimension, the proportion of face-to-face choices was calculated (for each group) and a Chi-Square test for two independent groups was performed to identify differences. None of the results were significant, thus reinforcing the conclusion that having fewer satellite-based synchronous tutorials does not affect students' attitudes towards this type of teaching/learning. Face-to-face tutorials are considered advantageous with respect to ten of the eleven cognitive and affective dimensions (for most dimensions, face-to-face tutorials were chosen by more than 70% of the students). On the last dimension (I prepare myself better for the tutorial), only 48% of Group 1 and 66.7% of Group 2 chose the face-to-face tutorial as better.

Group 2 students were asked a similar question with the same dimensions and an additional five (I remember more; It is more convenient; I prepare a written summary; I control my learning pace; Overall) concerning the choice between face-to-face tutorials, satellite-based synchronous tutorials and satellite-based asynchronous videocassettes. For most dimensions (except for "It is more convenient" and "I control my learning pace"), most students chose face-to-face tutorials. Satellite-based asynchronous videocassettes over rode the other two types of tutorials for all other students. 51.9% and 77.8% of students chose satellite-based asynchronous videocassettes when asked about convenience and control, respectively. When asked to make an overall choice between satellite based synchronous tutorials and satellite based asynchronous videocassettes, 60.7% chose the asynchronous mode and only 32.1% chose the synchronous mode.

Group 1 students were also asked about a hypothetical choice between satellite based synchronous tutorials and satellite based asynchronous videocassettes (hypothetical, as they didn't experience the second option). On most dimensions, the dominant choice was satellite based asynchronous videocassettes (except for "I am more involved in the learning process" and "I am more active"). When asked to make an overall choice between the two, 76.3% chose the asynchronous mode and only 23.7% chose the synchronous mode.

Individual differences in the choice of learning technologies: Do learning-habit preferences, as measured in our questionnaire, correlate with students' choices of different types of tutorials? Students in both groups were divided according to their overall choice between the satellite based synchronous tutorials and the satellite based asynchronous videocassettes. The two groups were compared on the 4 learning-habit preferences scores. **Table 6** presents those comparisons.

Table 6: Differences in learning-habit preferences between students who chose satellite based synchronous tutorial and students who chose satellite based asynchronous videocassettes.

Factors	**Prefer synchronous tutorials**	**Prefer asynchronous tutorials**	**Significance level**
Scale 1 – Time management	3.1 (0.9)	3.6 (0.6)	T(60)=2.36*
Scale 2 – Ease of accessibility to learning material	3.7 (0.6)	4.1 (0.5)	T(59)=2.4*
Scale 3 – Positive aspects of interactions	3.5 (0.5)	3.0 (0.6)	T(59)=2.4*
Scale – Negative aspects of interactions	4.0 (0.5)	3.8 (0.5)	---

The two groups of subjects differ in 3 of the 4 learning habit preferences scores. Those who chose the satellite-based synchronous tutorials were significantly higher on Scale 3 (believing in the positive aspects of interactions) and significantly lower on scales 1 (learning autonomy) and scale 2 (the need to "have" all the material).

Discussion and Conclusions

When choosing between face-to-face tutorials and satellite based-synchronous tutorials, most students prefer the former, replicating a previous study done at the OUI (Beyth-Marom et al., 2000). However, when choosing between satellite based-synchronous tutorials and satellite-based asynchronous videocassettes, two thirds of subjects prefer the latter. As in the previous study done at the OUI, most students prefer flexibility and control of their learning processes while studying at home with less social immediacy (with videocassettes) over the social immediacy they have (but less personal control) in synchronous satellite based tutorials.

In an effort to study the factors affecting students' choices and preferences, students were asked about their attitudes towards different interaction components. In both groups, students did not rate the interaction components (synchronous or asynchronous) as very important or contributing. All students answered a questionnaire about their learning-habit preferences. Students with a high score on the positive interaction factor (the subject holds more positive views regarding interactions with tutor and students) believe more than others in the social contribution of other students and in their learning contribution. Students with a high score on the negative interaction factor (the subject holds **few** views regarding the negative aspects of interaction) perceive students' interactions in class as less disturbing.

Students who preferred the satellite-based synchronous tutorials were compared to those who preferred the satellite-based asynchronous videocassettes on the 4 scales of the learning-habit preferences questionnaire. Those who preferred the synchronous tutorial were significantly higher in their belief in the positive aspects of interactions (Scale 3) and significantly lower on learning autonomy (Scale 1) and the need to "have" all material (Scale 2) than those who preferred the asynchronous mode.

In general, students' tutorial-mode preferences depend on their learning-habits preferences as measured on a Likert type questionnaire: their attitudes toward the control of learning and the possible contribution of interactions.

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